Claims

What is claimed is:

1. A wavelength-tunable add/drop device for adding or dropping n channels each having different center wavelength, comprising:

a first multicavity variable optical filter having a top end defining a first surface and a bottom end defining a second surface, said multicavity variable optical filter selectably operable to pass one channel while reflecting n-1 other channels or to reflect one channel while passing n-1 other channels, wherein the selection of the one channel to be passed or reflected depends upon a location where light is launched into one of the top and bottom ends of the first multicavity optical filter; and,

a broadband optical reflector directly adjacent to the multicavity variable optical filter and disposed between planes coincident with the first and second surfaces, the broadband reflector having a reflectivity that will reflect all n channels of light.

2. A wavelength-tunable add/drop device for adding or dropping n channels as defined in claim 1, wherein the broadband filter is spaced from the planes coincident with the first and second surfaces.

3. A wavelength-tunable add/drop device for adding or dropping n channels as defined in claim 1, wherein variable broadband optical filter is comprised of a first group of layers of high and low refractive index material, and wherein the broadband reflector is comprised of second different group of layers of alternating high and low refractive index material, and wherein the broadband reflector has a reflectivity that will reflect the n channels of light.

4. A wavelength tunable add-drop device as defined in claim 3, wherein the broadband optical reflector is a layer having a thickness other than a half wave, or integer multiple of a half wave.

5. A wavelength tunable add-drop device as defined in claim 3, wherein the broadband optical reflector is formed by providing an optical cavity substantially different from the other optical cavities such that decoupling from the other cavities occurs to thereby cause reflection to substantially all of the n channels of light.

6. A wavelength tunable add-drop device as defined in claim 2, wherein the broadband filter is comprised of one ore more metal or a dielectric layers.

7. A wavelength tunable add-drop device as defined in claim 2 wherein the broadband optical reflector is located distal from the plane coincident with the top and bottom ends at a location for simultaneously lessening phase mismatch and optical path length delay between different channels of light.

8. A wavelength tunable add-drop device comprising:

a filter having a first transmissive region and a second reflective region, said regions disposed between first and second opposite ends of the filter, a first end of the transmissive region for receiving a beam of light including a plurality of wavelength channels of light, and a second end of the transmissive region transmitting a different one of said channels of light therethrough in dependence upon a light receiving position on the first end of the filter, wherein the filter includes a plurality of optical cavities between opposite ends of the filter, each cavity having one or more half wave spacer layers of high or low refractive index material sandwiched between reflecting layers of material, the second reflecting region including a broadband optical reflector to all of the different channels of light, wherein said broadband optical reflector is disposed within or between one of the optical cavities.

9. A wavelength tunable add-drop device as defined in claim 8, wherein the broadband optical reflector is a layer having a thickness other than a half wave, or integer multiple of a half wave.

10. A wavelength tunable add-drop device as defined in claim 9, wherein the broadband optical reflector is substantially a quarter wave or integer multiple of a quarter wave in thickness.

11. A wavelength tunable add-drop device as defined in claim 9 wherein the broadband optical reflector comprises a layer which covers only a portion of the filter so that as a beam is positioned to be incident upon the first end of the filter, it may be positioned to be incident upon the transmitting region or the reflecting region.

12. A wavelength tunable add-drop device as defined in claim 2 further comprising means for selectively repositioning a light beam including the n channels along the first variable multicavity filter or along the broad band reflector or there between.

13. A wavelength-tunable add/drop device comprising:

a multicavity optical filter having a first region operable to add or drop a optical wavelength channel selected from a plurality of optical wavelength channels; and a second region, adjacent to said first region, said second region operable as a broadband optical reflector, wherein the first region comprises a tunable optical filter and wherein the second region includes a partial quarter wave or odd multiple quarter wave layer within the multicavity filter.

14. A wavelength-tunable add/drop device for adding or dropping n channels each having different center wavelength, comprising:

a first multicavity optical filter having a top end defining a first surface and a bottom end defining a second surface, said multicavity optical filter selectably operable to pass one channel while reflecting n-1 other channels or to reflect one channel while passing n-1 other channels, wherein the selection of the one channel to be passed or reflected depends upon a location where light is launched into one of the top and bottom ends of the first multicavity optical filter; and, a broadband optical reflector directly adjacent to the multicavity optical filter and disposed between planes coincident with the first and second surfaces.

15. A method of fabricating the multicavity filter and the broadband optical reflector as defined in claim 14 comprising the steps of:

a) providing a light substrate, transmissive to all n channels;

b) depositing a plurality of layers forming a plurality of optical cavities on the light transmissive substrate;

c) covering only a portion of a last deposited layer with a broadband reflecting layer reflective to all n channels;

d) depositing a layer of material over the surface of the broadband reflecting layer and a remaining portion of said last deposited layer to form a layer having a planar surface; and,

e) depositing a plurality of layers forming other optical cavities over said planar surface formed in step (d).